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QUALITATIVE AND QUANTITATIVE EVALUATION OF AN ERTS IMAGE (NASA 1005-13335). AREA: HUANCHACA, SANTA CRUZ COUNTY, EASTERN BOLIVIA

J. Pareja L.

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16. Abstract

Qualitative and quantitative evaluations of ERTS satellite images of an area in eastern Bolivia have been made by the Bolivian Geological Service.

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QUALITATIVE AND QUANTITATIVE EVALUATION OF AN ERTS IMAGE (NASA 1005-13335). AREA: HUANCHACA, SANTA CRUZ COUNTY, EASTERN BOLIVIA*

J. Pareja L.

1.0 INTRODUCTION /1**

The work here reported was performed at the YPFB (Yacimientos Petroliferos Fiscales Bolivianos = Bolivian Government Oil Deposits) Photogeology Department for the Exploration Division and at the request of the ERTS-Bolivia Project Management, as a contribution to the investigation and evaluation of the technical documentation provided by the National Aeronautics and Space Administration (NASA).

The main objective of the photointerpretation analysis performed was to assess the information to be obtained from a diazo false color composition obtained from the conjunction of three images in the MSS bands 4, 5 and 7, reproduced in the primary colors known in color film as cyan, magenta and yellow (Blue, red and yellow).

2.0 WORKING METHOD

Conventional photointerpretation methods based on shade, texture and morphology analysis, were used to obtain and assess

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* GEOBOL - Bolivian Program for the ERTS Natural Resources Satellite, P.O. Box 2729, La Paz, Bolivia.

** Numbers in the margin indicate pagination of the original foreign text.

the results in this evaluation and image comparison.

3.0 RESULTS OF THE INTERPRETATION

Due to the individual photointerpretation performed on each of the images mentioned above (diazo false color, MSS 4, 5 and 7) it was possible to recognize many characteristics, lineaments and units.

The units were designated by the letters of the alphabet from /2
A to D and E on some images, and from A to F on others.

We have preferred to retain this nomenclature in order to be able to group geological and hydrological units, as well as flora.

In this manner the results summarized in the attached table were derived.

TABLE 1. QUALITATIVE AND QUANTITATIVE EVALUATION OF ERTS IMAGES

Photointerpretation analysis results of the following images:

False color composition — NASA ERTS 1005-13335-4, 5, 7
NASA ERTS 1005-13335-4
NASA ERTS 1005-13335-5
NASA ERTS 1005-13335-7

	Color composition Bands 4, 5, 7	MSS 4 Image	MSS 5 Image	MSS 7 Image
Geology	Lithology: Very clear and precise definition	Lithology: Identifiable, subject to error	Lithology: Identifiable, subject to error	Lithology: Identifiable with precision
	Rock types: Three, A, B, C	Rock types: Three A, B, G	Rock types: Four A, B, D, G	Rock types: Four A, B, C, F
	Stratigraphical contacts: Very precise and conspicuous	Stratigraphical contacts: Not very clear, subject to error	Stratigraphical contacts: Not very clear, subject to error	Stratigraphical contacts: Very conspicuous
	Dips: Noticeable	Dips: Unclear	Dips: Noticeable	Dips: Clearly noticeable
	Stratigraphy: Identifiable	Stratigraphy:Identifiable	Stratigraphy:Identifiable	Stratigraphy: Identifiable
	Faults and fractures: Fairly clear and certain	Faults and fractures: Very clear	Faults and fractures: Very clear	Faults and fractures: Clear

	Color composition Band 4, 5, 7	MSS 4 Image	MSS 5 Image	MSS 7 Image
Photogeology	Photogeological elements: Based on shades and special characteristics, 6 different units were identified (A,B,C,D,E,F)	Photogeological elements: Based on shades and special characteristics, 7 units have been identified (A,B, C,D,E,F,G)	Photogeological elements: Based on shades & special characteristics, 7 units were identified (A,B, C,D,E,F,G)	Photogeological elements: Based on shades and special characteristics, 6 units have been identified (A,B,C, D,E,F)
Flora	Cultivated land: Not clear, vaguely outlined	Cultivated land: Vaguely outlined	Cultivated land: Clearly outlined	Cultivated land: Not visible at all
	Vegetation: Identifiable, not very differentiated (D)	Vegetation: Identifiable, differentiated (C,D)	Vegetation: Identifiable, differentiated (C,D,F)	Vegetation: Identifiable, not diferentiated (C)
Hydrology	Drainage: Only the main courses identifiable, with effort	Drainage: Identifiable in low vegetation density areas	Drainage: Every branch very visible and easily identified	Drainage: Perfectly identifiable
	Lakes: Absolutely visible due to the great contrast	Lakes: Can barely be seen	Lakes: Can barely be seen, subject to confusion	Lakes: Clearly visible due to great contrast
	Humid areas: Can be identified (E)	Humid areas: Can not be identified with certainty	Humid areas: Hard to identify	Humid areas: Very precisely outlined

	Color composition Bands 4, 5, 7	MSS 4 Image	MSS 5 Image	MSS 7 Image
	Swamps: Very clear outline (E)	Swamps: Can be mistaken for outcroppings; same shade and characteristics (E)	Swamps: Can be mistaken for outcroppings; same shade and characteristics (E)	Swamps: Identifiable with absolute certainty (D)
Assesment	Very useful in geology for its certain contact outlines and identification of outcroppings	Not very useful in geology and in agronomy, being subject to error	Useful in agronomy for the certainty in identifying vegetation areas	Useful in geology, this being the most convenient band Useful in agronomy to identify moist areas, but not to differentiate zones of vegetation

4.0 CONCLUSIONS

4.1 Under the subhead "Assessment", the Table on evaluation generally summarizes all the conclusions that could be obtained in the evaluation of each image.

4.2 The false color composition images and the black and white MSS 7 band images are the best and the most helpful in geological photointerpretation, because of the certainty with which rock types and their contacts can be identified.

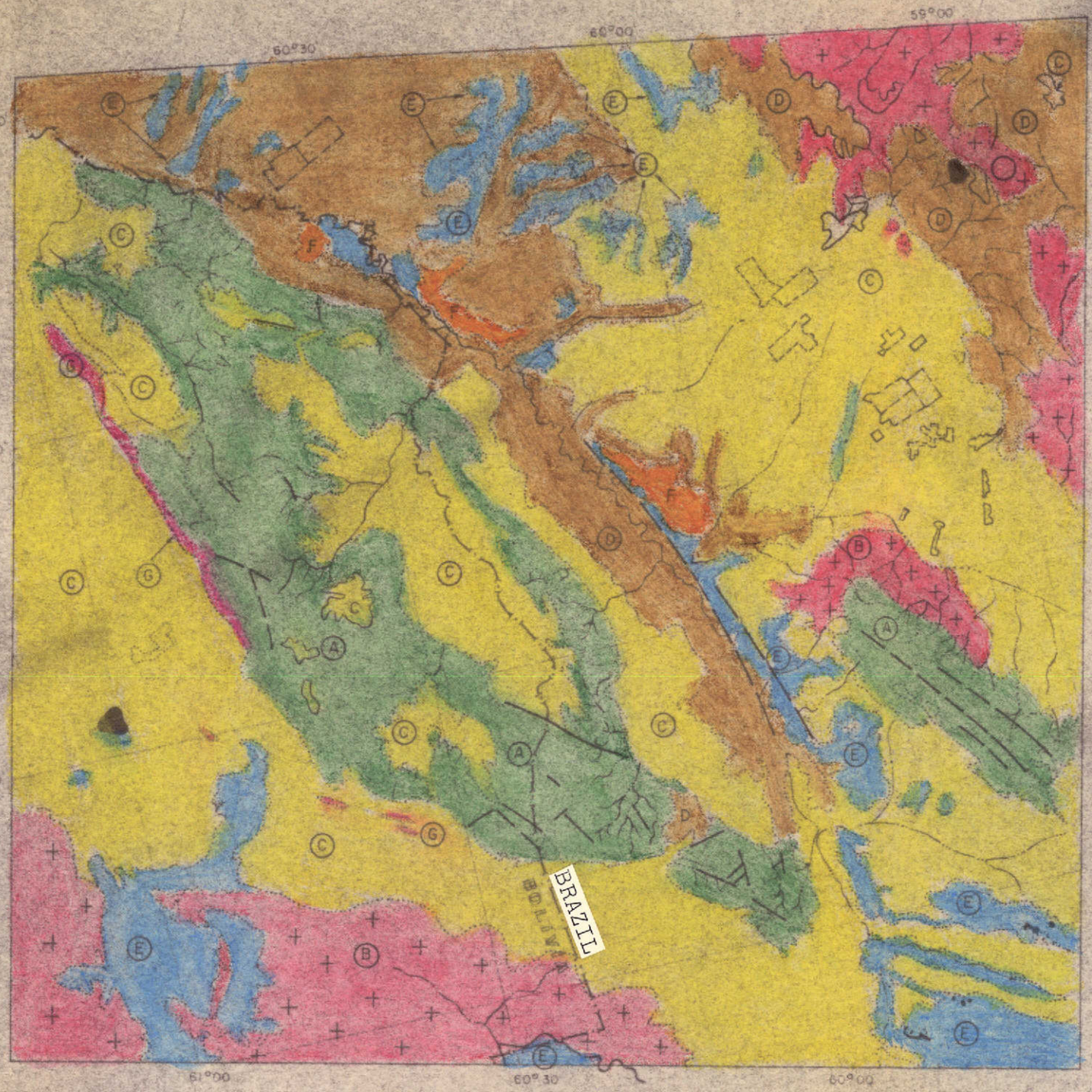
5.0 RECOMMENDATIONS

5.1 It is recommended that this type of analysis be performed on diazo false color, especially with images of the level areas, such as the benian plain and the Chaco area; this would lead to more information than can be obtained from black and white images.

5.2 Due to the relatively low cost of diazo film as compared to color film, its use is completely acceptable and recommended.

FOLDOUT FRAME 1

FOLDOUT FRAME 2



KEY

- Cretaceous rock
- Granitic rock
- Alluvial, with thick vegetation cover
- Alluvial, with low vegetation cover
- Swamps
- Sandy ground
- Cambrian rock
- Fractures
- Cultivated la
- Drainage
- Lakes

Y.P.F.B.	Exploration division Photogeology

MAP OF IDENTIFIABLE CHARACTERISTICS AND UNITS ON ERTS IMAGE 1005-13335

MSS band 5

AREA : HUANCHACA O CAPARUS

Scale 1 : 1 000 000

Author: Jorge Pareja Lopez

Drawing: F.B.A.

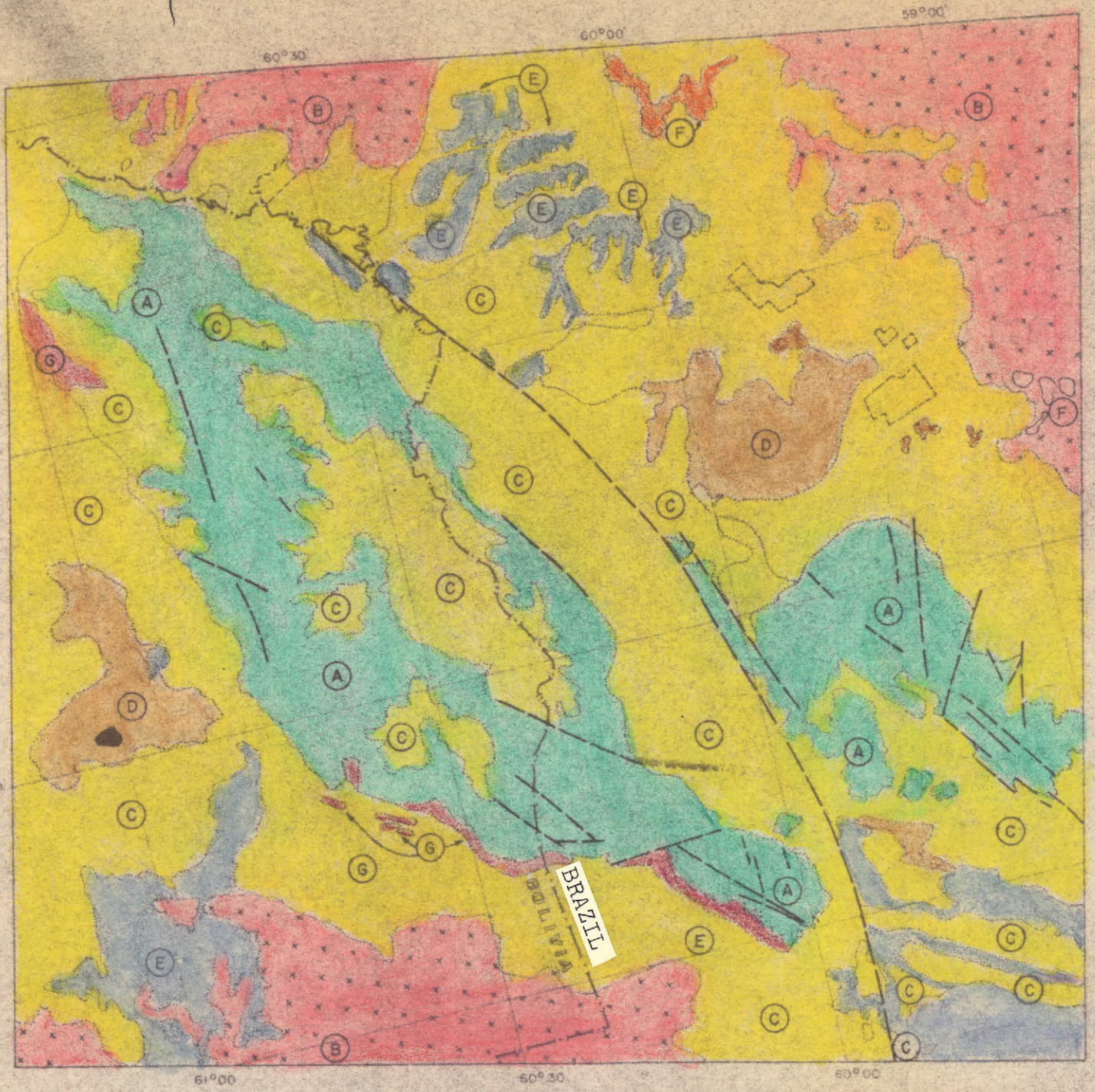
INF. No.

ADJ. No.

Santa Cruz, October - 1973

FOLDOUT FRAME 1

FOLDOUT FRAME 2



KEY

- A Cretaceous rock
- B Granitic rock
- C Thick vegetation cover
- D Low vegetation cover
- E Swamps
- F Sandy ground
- G Cambrian rock
- Fractures
- Cultivated land
- Lakes

Y.P.F.B.	Exploration division Photogeology

MAP OF IDENTIFIABLE CHARACTERISTICS AND UNITS ON ERTS IMAGE 1005-13335

MSS band 4

AREA : HUANCHACA O CAPARUS

Scale 1 : 1'000.000

Author: Jorge Pareja Lopez

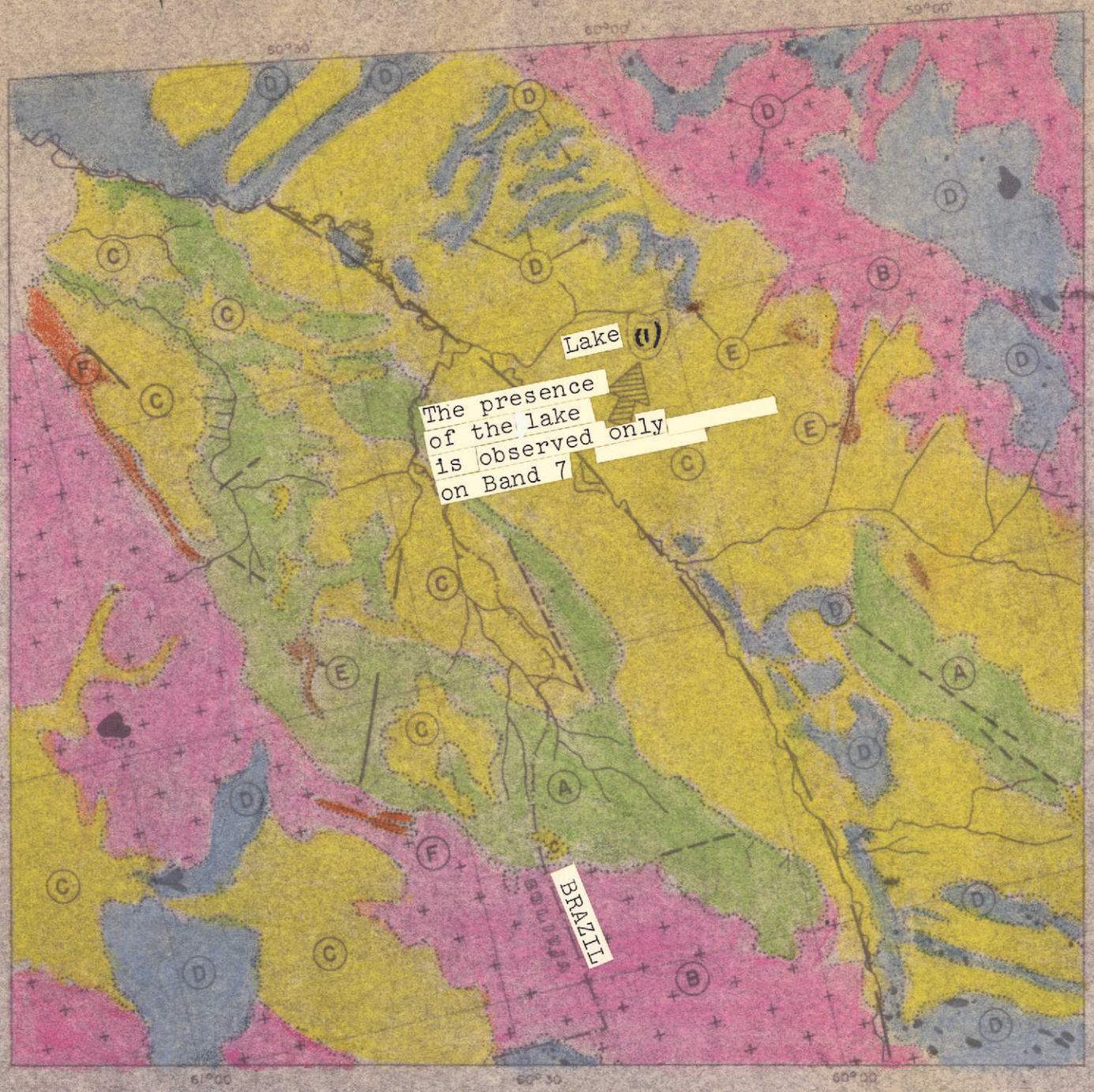
Drawing: F.B.A.

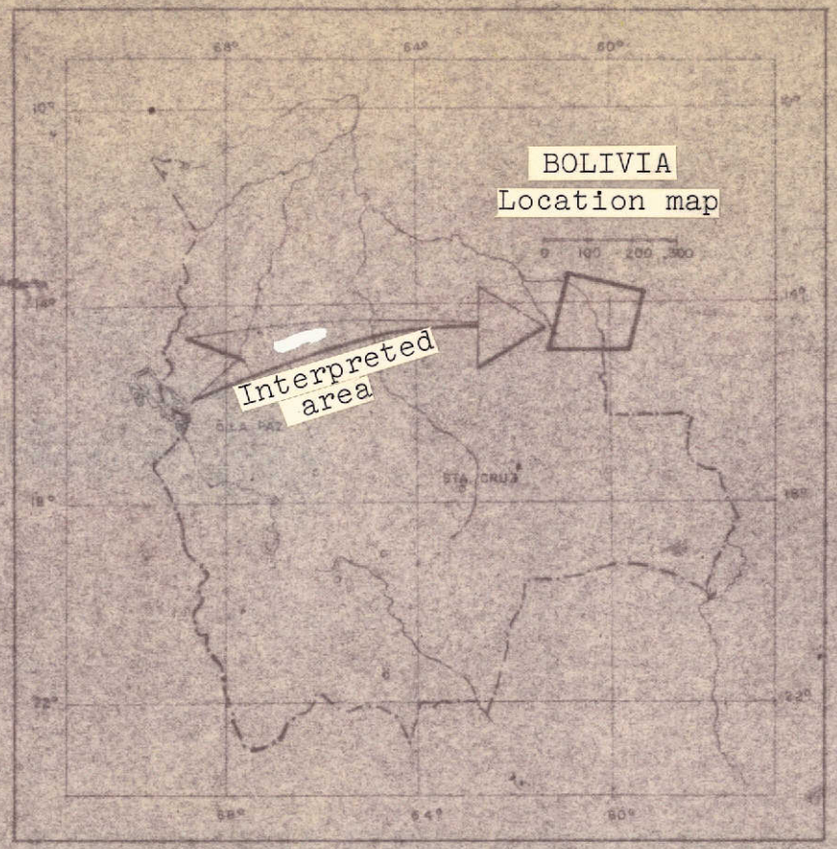
INF. No. | ADJ. No.

Santa Cruz, October - 1973

FOLDOUT FRAME 1

FOLDOUT FRAME 2





KEY

- Cretaceous rock — A
- Granitic rock — B
- Alluvial, with vegetation cover — C
- Swamps — D
- Sandy ground — E
- Fractures
- Lakes
- Newton ring — (1)
- Drainage

Y.P.F.B.	Exploration division Photogeology

MAP OF IDENTIFIABLE CHARACTERISTICS AND UNITS ON ERTS IMAGE 1005-13335

MSS band 7

AREA : HUANCHACA O CAPARUS

Scale 1 : 1'000 000

Author: Jorge Pareja Lopez

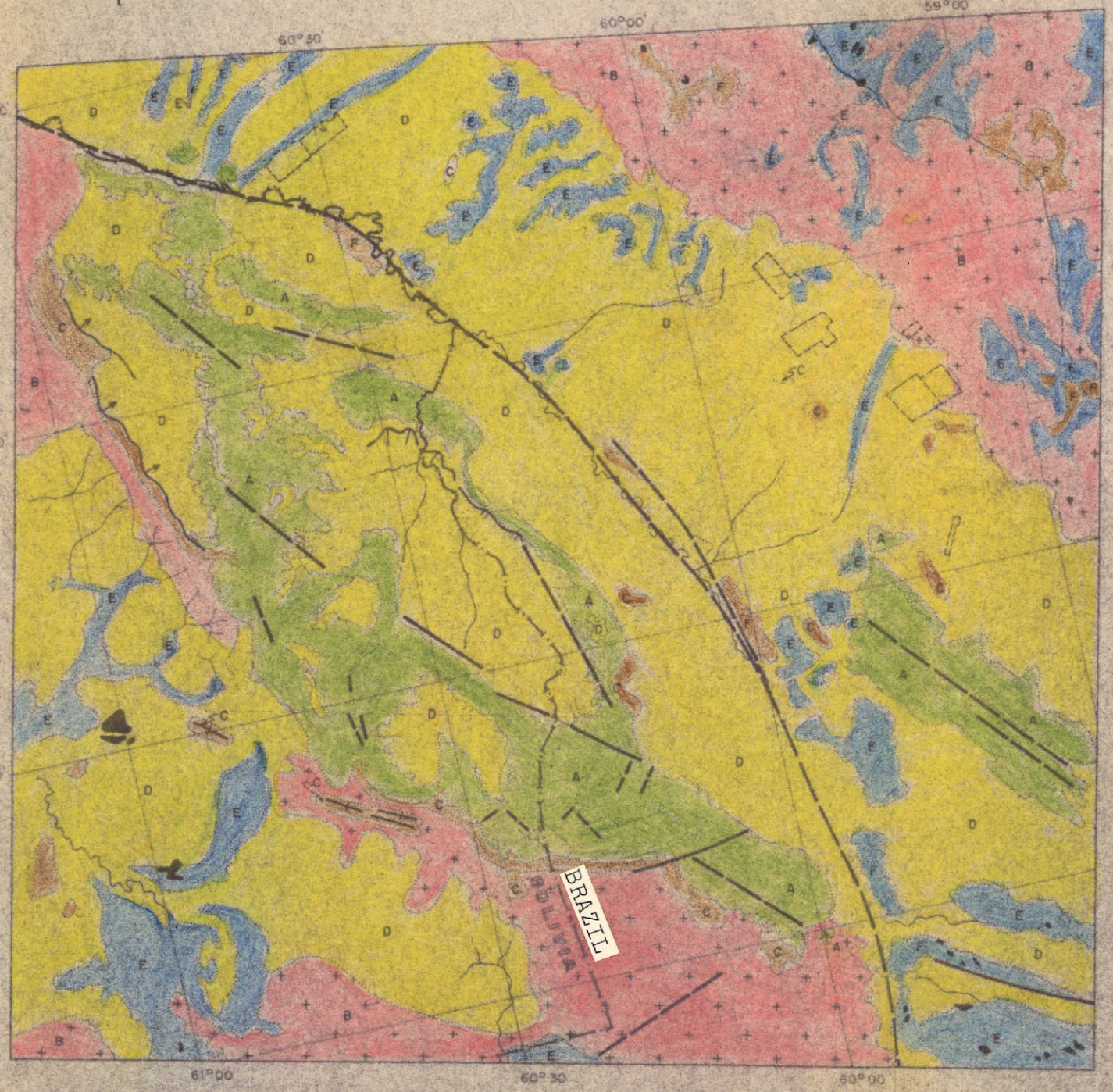
Drawing: F.B.A. - R.C.

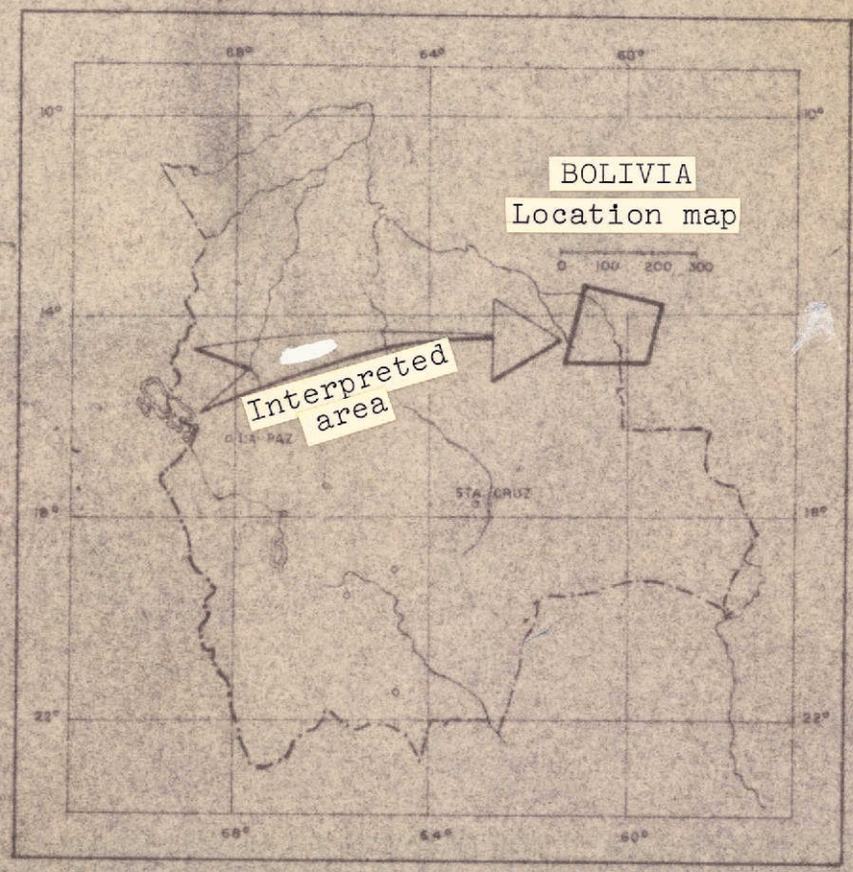
INF. No. | ADJ. No.

Santa Cruz, October - 1973

FOLDOUT FRAME 1

FOLDOUT FRAME 2





KEY

- A Cretaceous rock
- B Granitic rock
- C Cambrian rock
- D Vegetation covered
- E Swamps
- F Sandy ground
- Fractures
- Cultivated land
- Drainage
- Lakes

Y.P.F.B. | Exploration division Photogeology

MAP OF IDENTIFIABLE CHARACTERISTICS AND UNITS ON ERTS IMAGE 1005-13335

False color composition

AREA : HUANCHACA O CAPARUS

Scale 1 : 1'000.000

Author: Jorge Pareja Lopez

Drawing: B.V.R.- F.B.A.

INF. No. | ADJ. No.

Santa Cruz, October - 1973